



IFW

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of

YAMAMOTO et al

Atty. Ref.: 1417-552; Confirmation No.

Appl. No. 10/594,676

TC/A.U.

Filed: September 28, 2006

Examiner: unknown

For: PROCESS FOR PRODUCING POLYBUTYLENE TEREPHTHALATE

\* \* \* \* \*

January 17, 2007

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**SUBMISSION OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

Attached is a copy of the International Preliminary Report on Patentability (English version) mailed November 23, 2006 and issued in the underlying International patent application.

Please consider this information when examining the above-identified U.S. National stage application.

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

By: \_\_\_\_\_

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From the INTERNATIONAL BUREAU

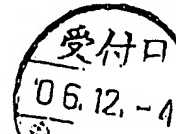
## PCT

NOTIFICATION OF TRANSMITTAL  
OF COPIES OF TRANSLATION  
OF THE INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY  
(CHAPTER I OR CHAPTER II  
OF THE PATENT COOPERATION TREATY)  
(PCT Rules 44bis.3(c) and 72.2)

To:

OKADA, Kazuhiko  
Okada & Associates, 6F, Kudan Kangyo Bldg., 10-1,  
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1020073  
JAPON

A24-2 PCT



Date of mailing (day/month/year)  
23 November 2006 (23.11.2006)

Applicant's or agent's file reference  
A5005-WO

IMPORTANT NOTIFICATION

International application No.  
PCT/JP2005/008209

International filing date (day/month/year)  
28 April 2005 (28.04.2005)

Applicant

MITSUBISHI CHEMICAL CORPORATION et al

## 1. Transmittal of the translation to the applicant.



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

## 2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, GR, HU, ID, IL, IN, IS, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

## 3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

Yoshiko Kuwahara

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference A5005-WO	FOR FURTHER ACTION		See item 4 below
International application No. PCT/JP2005/008209	International filing date (day/month/year) 28 April 2005 (28.04.2005)	Priority date (day/month/year) 10 May 2004 (10.05.2004)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant MITSUBISHI CHEMICAL CORPORATION			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                               |                                                                                                                                                                 |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report                                                                                                                                             |
| <input type="checkbox"/> Box No. II           | Priority                                                                                                                                                        |
| <input type="checkbox"/> Box No. III          | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability                                                                |
| <input type="checkbox"/> Box No. IV           | Lack of unity of invention                                                                                                                                      |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI           | Certain documents cited                                                                                                                                         |
| <input type="checkbox"/> Box No. VII          | Certain defects in the international application                                                                                                                |
| <input type="checkbox"/> Box No. VIII         | Certain observations on the international application                                                                                                           |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis.2).

Date of issuance of this report  
14 November 2006 (14.11.2006)

Authorized officer

Yoshiko Kuwahara

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## PATENT COOPERATION TREATY

TRANSLATION

From the  
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing  
(day/month/year)

Applicant's or agent's file reference

A5005-WO

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2005/008209

International filing date (day/month/year)

28.04.2005

Priority date (day/month/year)

10.05.2004

International Patent Classification (IPC) or both national classification and IPC

Applicant

MITSUBISHI CHEMICAL CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1b(gb) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/IP

Authorized officer

Facsimile No.

Telephone No.

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WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCI/JP2005/008209

Box No. 1

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐

This opinion has been established on the basis of a translation from the original language into the following language

\_\_\_\_\_ which is the language of a translation furnished for the purposes of international search (under

Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐

a sequence listing

☐

table(s) related to the sequence listing

b. format of material

☐

in written format

☐

in computer readable form

c. time of filing/furnishing

☐

contained in the international application as filed.

☐

filed together with the international application in computer readable form.

☐

furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY		International application No. PCT/JP2005/008209																		
Box No. V	Reasoned statement under Rule 43bis1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																			
1. Statement																				
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">Novelty (N)</td> <td style="width: 50%; border-bottom: 1px solid black;">Claims 1-15</td> <td style="width: 20%; text-align: right;">YES</td> </tr> <tr> <td></td> <td style="border-bottom: 1px solid black;">Claims</td> <td style="text-align: right;">NO</td> </tr> <tr> <td style="vertical-align: top;">Inventive step (IS)</td> <td style="border-bottom: 1px solid black;">Claims 1-15</td> <td style="text-align: right;">YES</td> </tr> <tr> <td></td> <td style="border-bottom: 1px solid black;">Claims</td> <td style="text-align: right;">NO</td> </tr> <tr> <td style="vertical-align: top;">Industrial applicability (IA)</td> <td style="border-bottom: 1px solid black;">Claims 1-15</td> <td style="text-align: right;">YES</td> </tr> <tr> <td></td> <td style="border-bottom: 1px solid black;">Claims</td> <td style="text-align: right;">NO</td> </tr> </table>			Novelty (N)	Claims 1-15	YES		Claims	NO	Inventive step (IS)	Claims 1-15	YES		Claims	NO	Industrial applicability (IA)	Claims 1-15	YES		Claims	NO
Novelty (N)	Claims 1-15	YES																		
	Claims	NO																		
Inventive step (IS)	Claims 1-15	YES																		
	Claims	NO																		
Industrial applicability (IA)	Claims 1-15	YES																		
	Claims	NO																		
2. Citations and explanations:																				
<p>Document 1: JP 2004-68001 A (Mitsubishi Chemical Corporation), 04 March 2004                  Document 2: JP 2003-73466 A (Toray Inc.), 12 March 2003</p> <p>Claims 1-15</p> <p>The inventions described in Claims 1-15 appear to involve an inventive step over documents 1 and 2 cited in the ISR.</p> <p>Documents 1 and 2 do not describe establishing the following Formulae (I) and (II) wherein TM is the number of moles of terephthalic acid supplied per unit of time, BM is the number of moles of total 1,4-butanediol supplied to each esterification reaction tank per unit of time, <math>\alpha</math> is the concentration of the titanium compound catalyst used in the esterification reaction (weight concentration of titanium atoms per final amount of PBT) and P is the pressure of the esterification reaction tank in a method of manufacturing polybutylene terephthalate using a 1- or multi-stage esterification reaction tank by continuous esterification of terephthalic acid and 1,4-butanediol in the presence of a titanium compound catalyst followed by a condensation reaction, and it appears that the invention of this application thereby achieves the useful effects of suppressing side reactions while manufacturing PBT excellent in color tone and transparency and reduced in foreign matter content.</p> <p style="margin-left: 40px;"><math>\beta = BM/TM - 0.03 \times \alpha + 0.045 \times P \dots (I)</math></p> <p style="margin-left: 40px;"><math>\beta = 4.0 \sim 7.0 \dots (II)</math></p> <p>(wherein <math>\alpha</math> represents ppm and P represents kPa).</p>																				